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Prepared in Anticipation of Litigation

BUTTE PRIORITY SOILS OPERABLE UNIT
SILVER BOW CREEK/BUTTE AREA
SUPERFUND SITE

Draft

Operation, Maintenance, and Monitoring (O&M) Plan for Butte Priority Soils Operable Unit

Volume III
West Camp Pump Station/Missoula Gulch Drainage

Atlantic Richfield Company

January 4, 2011

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Operation, Maintenance, and Monitoring (O&M) Plan for Butte Priority Soils Operable Unit

Volume III

West Camp Pump Station/Missoula Gulch Drainage

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January 4, 2011

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1.0 INTRODUCTION

The *Draft Operation, Maintenance and Monitoring (O&M) Plan for Butte Priority Soils Operable Unit* consists of multiple Volumes (I through V). Each volume is used to describe specific aspects of the Operation and Monitoring (O&M) Plan. This document, Volume III, presents the *West Camp Pump Station (WCP) and Missoula Gulch Discharge Systems Operation, Maintenance and Monitoring (O&M) Plan*. The information is provided to allow proper operation and routine maintenance of the system. Ancillary information which is useful to this manual is provided in the appendices section of this manual. The following list of appendices is provided for additional reference:

- Appendix A: System Drawings;
- Appendix B: System and Component Design Calculations;
- Appendix C: Administrative Order On Consent for West Camp/Travona System;
- Appendix D: Operator's West Camp Reference Guide, BTL-LAO Ops Report;
- Appendix E: List of Equipment, Protective Safety Devices (PSDs), and Alarms;
- Appendix F: Standard Operating Procedures (SOPs);
- Appendix G: Manufacturer's Product Data;
- Appendix H: Butte Remediation Evaluation System (BRES);
- Appendix I: Seasonal Pumping Flow Rates;
- Appendix J: West Camp Retention Time/ Holding Capacity; and
- Appendix K: Emergency Hospital Route from West Camp.

1.1 Purpose and Scope

West Camp and Missoula Gulch are located within the Butte Mine Flooding Operable Unit (BMFOU) of the Silver Bow Creek/Butte Area National Priorities Listing (NPL) Superfund Site. The objective of this O&M Plan is to provide instructions for operating and maintaining the West Camp groundwater extraction and conveyance system and the Missoula Gulch discharge system. It contains key components for an O&M Manual as presented in the U.S. Environmental Protection Agency's (EPA) guidance Fact Sheet *Operation and Maintenance in the Superfund Program, OSWER 9200.1-37 FS* (EPA, 2001) and Section 3.5.2 of OSWER Directive 9355.0-4A, *Superfund Remedial Design and Remedial Action Guidance* (EPA, 1986). Figure 1 identifies the entire site and major features within West Camp and Missoula Gulch. System drawings are provided in Appendix A.

The following sections describe the treatment system, performance goals, routine operations, record keeping and reporting requirements, routine inspection and maintenance programs, and emergency procedures. All activities conducted in association with this document are to be performed in compliance with the *Butte Treatment Lagoons (BTL) and Lower Area One (LAO) Site Specific Health and Safety Plan for Operation and Maintenance (O&M) Activities* (Pioneer, 2010).

1.2 System Background

The design objectives of the WCP-1 groundwater extraction system, as stated in the *Operations and Maintenance Manual West Camp Pumping System Revision 1* (Atlantic Richfield Company, 2006a), were to reduce pumping costs by placing the system at a lower elevation, and to provide

two options for discharging the water. The extraction system is constructed so that groundwater can be routed to the BTL at LAO, or routed to the Butte-Silver Bow (BSB) Sewage Treatment Plant via a pipeline directly connected to the BSB sewer system (currently abandoned and capped). Normal, routine operation of the WCP-1 system discharges water to the BTL at LAO. Because West Camp water is part of the BMFOU and contains elevated levels of arsenic, it is necessary to treat the pumped water prior to discharge to waters of the State of Montana. Water treatment occurs within the BTL system by means of chemical addition and physical settling processes.

West Camp Pump Station (WCP-1) was implemented to maintain water levels below the critical water level established at 5,435 feet above mean sea level (amsl) and prevent affected groundwater from infiltrating into the alluvial water. Volume I contains more detailed background information for this pumping station.

1.3 Design Theory

As stated above, the objective of WCP-1 is to maintain water levels in the West Camp system below the established critical water level of 5,435 feet amsl. West Camp Pump Station operates to maintain the water level of this system approximately 10 feet lower than the critical water level. To achieve this objective, the pumping system was designed to operate between 70 to 300 gallons per minute (gpm). Best efficiency pumping point is 250 gpm. Flow rate is dependent upon the BTL capacity, and annual recharge rate. The pump was designed and selected to operate continuously; therefore, a variable frequency drive (VFD) motor provides the ability to control pump flow rate through speed control to maintain a nearly constant water level within the well.

The extraction well, in which WCP-1 operates, was installed using air rotary drilling, and is constructed of coupled 8-inch inside diameter (ID) schedule 80 polyvinyl chloride (PVC) blank casing and 30 feet of 0.125-inch slot v-wire wrap, stainless-steel screen (Appendix G) positioned from approximately 463 to 493 feet below surface grade. Stainless steel was chosen for the screen material for its resistance to hydrogen sulfide (H_2S) corrosion. The well screen was designed to have an intake capacity of approximately 700 gpm. The above-ground wellhead is a MAASS heavy duty steel well casing with vented cap. A MAASS Model NB stainless steel pitless adapter is installed in the well casing to accommodate subgrade entry of the pump discharge piping into the precast pump building.

From the pump discharge, 4-inch, Class 350, epoxy lined, ductile iron pipe fabricated in accordance with AWWA C151 standards, is installed within the pump house. The piping system is fitted with flanged connections designed in accordance with ANSI/AWWAC110/A21.10, flanged valves are in accordance with ASME B16.1, Class 125# rating. Piping and associated components transition from 4-inch ductile iron, to 4-inch PVC C900, then eventually to 6-inch PVC SDR21 piping. The SDR21 piping existed at the time of the upgrade, and was therefore utilized from the tie-in point to final termination at the Hydraulic Control Channel (HCC) or BSB Water Treatment Plant. Refer to drawings sheets WCP-D-7 through D-11 located in Appendix A.

Piping from the pump discharge was designed to convey fluid flow with a maximum velocity less than 9 feet per second (ft/s). Normal fluid velocity is approximately 5 ft/s. *The Piping*

Handbook defines acceptable fluid velocity range in "general water services" as 4 to 10 ft/s (*Piping Handbook, 6th edition*, Nayyar, 1992).

The system was designed to continuous pumping operations over a 25-year service life. The service life provides the basis of operating technologies selected and equipment cost amortizations.

1.3.1 Design Calculations

Pump selection and pipe diameters are based upon recognized standard engineering calculations and industry design principles. Supporting design calculations which provide justification of equipment selection are located in the Appendix B.

1.3.2 Codes and Standards

The following codes and standards are followed throughout the design of system components. Local jurisdiction and building code prevails in areas of conflicting terminology.

1.3.2.1 Mechanical Codes and Standards

Mechanical codes and standards include:

- American Water Works Association (AWWA);
- American National Standards Institute (ANSI); and
- American Society of Mechanical Engineers (ASME).

1.3.2.2 Instrumentation and Electrical Codes and Standards

Instrumentation and electrical codes and standards include:

- International Standards of Automation (ISA);
- ISA-84 Process Safety Standards; and
- National Electric Code (NEC).

1.3.2.3 Civil/ Structural Codes and Standards

Civil and structural codes and standards include:

- American Association of State Highway and Transportation Officials (AASHTO); and
- International Building Code (IBC) 2006.

1.3.3 Constituents of Concern

The primary Constituent of Concern (COC) is arsenic at an average concentration of 0.1 milligrams per Liter (mg/L). Other heavy metals including arsenic, cadmium, copper, lead, mercury, and zinc may be present in this fluid stream. H_2S may also be present in this flow stream resulting in mildly corrosive liquid, H_2S gas within contained areas.

1.3.4 Materials of Construction

Precautions have been taken regarding the materials of "wetted" components. Metallic piping materials are epoxy coated ductile iron to protect the metallic iron surface of the inside of the pipe. Valves gates are epoxy coated. Non-metallic components are non-reactive and require no additional treatments.

1.4 Owner and Contact Information

Atlantic Richfield Company (Atlantic Richfield) is a Potentially Responsible Party (PRP) of the BTL-LAO water treatment system. Operation and maintenance of the system is the responsibility of the PRP. Duties associated with proper O&M may be tasked to a contractor, or owner's representative.

1.4.1 Key Contacts / Emergency Information

BP Incident Notification Center **1-800-831-8642**

Atlantic Richfield Co.	**Office (406)**	**Mobile (406)**	**Home (406)**
Trey Harbert	723-1816	498-5749	
Shannon Dunlap	723-1813	498-6630	
Kevin Murphy	630-836-7124	219-545-4725	
Pioneer Technical			
Dave Griffis	563-9371 ext. 306	490-4210	
Brad Archibald	497-8019	490-3032	494-6549
Pat Sampson	782-5797	490-0706	
Brad Hollamon	782-5797	490-7678	782-3243
Steve Lubick	563-9371	490-7680	782-1702
Ian St. John	782-5797	490-4900	
Tara Schleeman	497-8026	490-8272	533-0913

EPA		
Sara Sparks	782-3264	949-4149
DEQ		
Joe Griffin		560-6060

1.4.2 Additional Emergency Contact Agencies

Emergency Response	911
Disaster-Emergency	(406) 497-6295
NorthWestern Energy	
Emergency	1-888-467-2427
Electrical Emergency	1-888-467-2353

1.4.3 Non-emergency Services

Police	(406) 497-1120
Mt. Highway Patrol	(406) 494-3233
Fire Department	(406) 497-6481
Water Company	(406) 497-6500
Butte Silver-Bow County Public Works	(406) 497-6515
Metro Sewer Plant	(406) 497-6550
NorthWestern Energy Connect and Repair	1-888-467-2669
Qwest Comm.	1-800-954-1211
Underground Utilities	1-800-424-5555
MT Department of Highways	(406) 494-9600
St. James Hospital (Butte)	(406) 723-2500

Local Resources -- company names, contact name, phone numbers, description of resources
Oil Spill Response Contractors (OSROs)
ATLATL Inc. (406) 723-7980

1.5 Organization and Use of this O&M Plan

This O&M Plan contains information describing how to operate and maintain the West Camp and Missoula Gulch systems. In addition, the plan provides (the operator) the necessary background and overview of the systems, and how they are intended to function during various operating conditions. Complete system performance standards are presented in Volume I of the BPSOU O&M Plan. Detailed documentation and instructions are provided to establish the necessary procedures for both routine operations and special circumstances. Each section in the plan is described briefly in the following paragraphs:

- **Section 2.0: System Description** is presented in six subsections. Each subsection provides an overview of each major component of the system and its function. Substantial detail for the design basis, technical features, and capabilities of each facility component are also provided. This section is designed to be the initial reference to the operator for system optimization.

- **Section 3.0: System Controls** describes the system components and operational parameters to efficiently control water flows and levels associated with West Camp and Missoula Gulch. It also describes how to use these components during various types of conditions that may be encountered at West Camp and Missoula Gulch.

- **Section 4.0: Safe Operating Limits** describes the operating limits of the system components to prevent damage or failure of the system which could potentially impact worker safety of the environment. This system provides safe operating pressure, temperature, and concentration limits as applicable to system components.

- **Section 5.0: Routine Operations** provides a description of routine system monitoring and oversight. Also provided are details for routine operational conditions for the various facilities and procedures for establishing, verifying, or changing settings. Standard Operating

Procedures will be referenced in this section as developed and subsequently appended as operational experience is gained. All SOPs related to the operation of this system are located in Appendix F.

- **Section 6.0: Operation During Disturbances** identifies various types of upset conditions that may occur. Alternative response/mitigation measures, approaches to identifying the cause of problems, and sources of additional information and assistance are provided.

- **Section 7.0: Monitoring and Laboratory Testing** defines the measurements and observations required for West Camp and Missoula Gulch. This includes both monitoring for operation and process control, and monitoring required by regulatory agencies. A method is provided for summarizing the data so that the operator can detect trends and respond with appropriate changes in operation. In addition, the operator must review the monitoring data for compliance with performance standards (see Volume I) and submit monitoring reports as required (see Section 8.0).

- **Section 8.0: Data Management** discusses the generation of automated monitoring data and transfer of that data to the master database for storage.

- **Section 9.0: Operations Reporting and Record Keeping** outlines the reporting requirements, responsibilities, and intervals.

- **Section 10.0: Routine Inspection and Maintenance** schedules for all pumping systems and other system components are provided. Additional detailed maintenance requirements are located in Volume V.

- **Section 11.0: Emergency Procedures** are established for response to various alarm conditions as well as the use of emergency/back-up equipment.

- **Section 12.0: References** used to generate this West Camp/Missoula Gulch O&M Plan are included in this section.

2.0 SYSTEM OVERVIEW

Volume I provides a system background and overview of the O&M Plan for the water collection, transfer, and treatment systems located within BPSOU and BMFOU.

Volume I includes the following:

- System Performance Standards (Section 3.0);
- Butte Treatment Lagoons (BTL) and Lower Area One (LAO)
- *Site Specific Health and Safety Plan for Operation and Maintenance (O&M) Activities (*Pioneer, 2010) (Section 5.0 discussion); and
- Revisions and updates to the O&M Plan (Section 7.0).

Figures showing emergency routes to the hospital from each site are included in their own respective volumes as separate appendices in the *Butte Treatment Lagoon (BTL) Operation, Monitoring, and Maintenance Manual* (i.e., Volume II through Volume IV).

Volume III contains information relevant to the operations and routine maintenance tasks associated with the West Camp including WCP-1. Historical background information is provided in this volume where it provides guidance for operating the system. Legacy background information is provided in Volume I. Equipment maintenance and overall haul instructions are contained in Volume V, Maintenance Plan.

West Camp can be divided into six basic components:

- General Facility;
- Extraction Well and Pumping System (WCP-1);
- Water Conveyance and Piping;
- Monitoring and System Controls;
- Electrical Systems; and
- Backup Systems and Spare Parts.

The Missoula Gulch Base Flow Collection System can be divided into the following components.

- Catch Basin 8 (CB-8);
- Catch Basin 9 (CB-9);
- Bypass Pipelines and Overland Flow Channels;
- Centennial Avenue Culvert; and
- Diversion Channel Discharge.

System components, manufacturer's information, model number, part number, purchase and installation date, and contact information is located in Appendix G. Life expectancy, inspection and maintenance interval is located in Volume V, Maintenance Plan.

2.1 General Facility

The WCP-1 site is located at 526 Centennial Avenue in Butte. The facility is secured from unauthorized entry by an 8-foot high, 36-foot by 36-foot, 9-gauge chain-link fence, with 2 locked gates. The site is less than 1/10 acre, including a parking area located at the west gate. Refer to Drawing WCP-C-1, West Camp Pump Station General Site Plan provided in Appendix A. Storm water from the site is drained to the west and south through a riprap-lined channel. The principal features of the facility within the locked compound include the groundwater extraction well, the pump house, monitoring well, and emergency generator.

The Missoula Gulch Baseflow System extends from the inlet of CB-8 (located south of the Iron Street/Excelsior Avenue Overpass) to the system discharge point at the diversion channel located in Butte Reduction Works (BRW). The system is interconnected by a series of bypass pipelines, overland channels, and culverts. Flow within the system is regulated by the capacities of CB-8 and CB-9 (located immediately north of Centennial Avenue), orifice weir plates, concrete by pass structures, and spillways. Butte-Silver Bow is responsible for maintenance of the Missoula Gulch Base Flow system. References to this system and associated catch basins are made to capture the hydraulic flows of the entire West Camp subsurface hydraulic system.

2.2 Extraction Well and Pumping System

The drilling and construction of WCP-1 was conducted under the specifications of the *Work Plan for West Camp Groundwater Extraction System* (AERL, 1998a). Construction of the system is documented in *Completion Report for the West Camp Extraction System, Butte Mine Flooding Operable Unit* (AERL, 1998b). Subsequent upgrades and modifications to the monitoring equipment were documented in the *Draft Butte Treatment Lagoons (BTL) Systems at Lower Area One (LAO) Construction Completion Report* (Atlantic Richfield Company, 2006b). Current design modifications and improvements are per the specifications of the *Butte Treatment Lagoons (BTL) and West Camp Pump Station (WCP-1) Upgrades Design Report/Work Plan* (Atlantic Richfield Company, 2010).

Drawing sheets WCP-D-7 through D-13 provide West Camp piping, pump house, and mechanical details. Site civil details are provided in Drawings WCP-C-1 through C-4, and D-1 through D-6. System electrical details are located in Drawings D46-15IN-023 through 029 (see Appendix A).

The extraction well, WCP-1, is installed directly into the 800-foot sill of the Travona Mine, as are monitoring well BMF96-1D and former well AMC-21. These wells have direct hydraulic connection to West Camp. Well WCP-1 was installed following procedures that are consistent with *Clark Fork River Superfund Site Investigations (CFRSSI) SOP GW-3* (ARCO, 1992). The borehole was advanced using air rotary drilling. The well was constructed using coupled 8-inch inside diameter (ID) schedule 80 PVC blank casing and 30 feet of 0.125-inch slot v-wire wrap stainless-steel screen (Appendix G). The well screen was designed to have an intake capacity of approximately 700 gpm. The screened interval is positioned from approximately 463 to 493 feet below ground surface (bgs). The well construction was completed on October 23, 1997.

Following construction of the well, a 6-inch submersible, 15 HP, 480 volt, 3-phase Goulds pump Model 250L15 (Appendix G) was installed on 4-inch Certa-Lock schedule 80 PVC (Appendix G) and positioned at a depth of approximately 105 feet bgs. A VFD controller (Appendix G), mounted on the south interior wall of the pump house, operates the pump. A new 12-inch MAASS® Model MB stainless steel pitless adapter (Appendix G) was added to the extraction well (2010) to accommodate West Camp upgrades described in *Draft Final Butte Treatment Lagoons (BTL) and West Camp Pump Station (WCP-1) Upgrades Design Report/Work Plan* (Atlantic Richfield Company, 2010).

A 4-inch check valve, installed directly above the pump, prevents impeller damage due to loss of flow. A weep hole was drilled through the pipe above the check valve to allow the piping system to drain back below ground surface. The pipe will automatically drain in the event that the pump is shut down, and prevent water from freezing in the above-ground portion of the piping. A performance curve for the pump is presented in Appendix G. The 4-inch ductile iron discharge pipe is connected to the 6-inch SDR 21 PVC force main pipeline that discharges to LAO. The 4-inch ductile iron pipe is installed from the WCP-1 pump house to the 6-inch SDR 21 PVC pipeline that discharges to the BSB sewer main.

A 10-foot by 12-foot precast concrete building is set on a 14-foot by 26-foot concrete pad approximately 3 feet north of well WCP-1. The pump house is also equipped with 18-inch Greenheck aluminum air circulation louver, an 18-inch Greenheck shutter mounted exhaust fan, and heated with a Chromolox Model HCH-251 Air Heater (Appendix G) equipped with a thermostatic control and upright position sensor. The fan and heater maintains pump house temperature and provides ventilation.

Groundwater in West Camp contains H_2S, which in certain concentrations is a highly toxic and corrosive gas. All components of the extraction system that are in contact with West Camp groundwater are designed to be resistant to H_2S.

2.3 Water Conveyance and Piping

Missoula Gulch storm water is kept separate from the groundwater flows of the West Camp system. The following is provided to describe the hydraulic relationship of each system as it is introduced into the BTL-LAO treatment system.

2.3.1 West Camp Pump (P-WCP-1)

Groundwater is pumped from the collection well using a Goulds Model 250L15, 5-stage, submersible, stainless steel turbine pump. The pump has an operating range from 70 to 300 gpm. Proper rotation is counter clockwise. Operation below the minimum recommended flow rate increases motor amperage draw which could trip overload protection and cease pump operation. A variable speed controller is used to control the pump discharge flow. The pump is designed, rated and fabricated for continuous operation; however, the unit is also field-serviceable. Once removed from the well, all parts can be dismantled should field service be required.

The manufacturer's nomenclature (Goulds Pumps) provides the pump's operating characteristics. The initial number set (250) indicated the ideal discharge flow, the letter "L" indicates the pump model, and the final number set indicates the nominal horsepower rating.

Per BP *Site Remediation Technologies Engineering Integrity Manual* (BP, 2009), Section 9.2 guidelines, all above ground piping is epoxy-coated ductile iron pipe, which is transitioned to PVC C900 piping below ground. The 4-inch ID, ductile iron discharge line from well WCP-1 is plumbed directly into a 48-inch precast manhole beneath the southwest corner of the precast concrete building. A removable steel grate provides access to the manhole and plumbing. The discharge line includes a 90-degree elbow upward into the precast operations building, and then travels horizontally through the building until another 90-degre elbow directs the piping into another manhole located in the northeast corner of the building (see Drawings WCP-D-7 through D-10, provided in Appendix A).

2.3.2 Pressure Gauge (PI-WCP5013) and Flow Meter (FIT-WCP5006)

Inside the pump house, the discharge pipe features a Dwyer 2-inch SS Pressure Gage (PI-WCP5013), 4-inch McCrometer® UltraMag flow meter (FIT-WCP5006), and 4-inch Mueller butterfly valve (BFV-WCP5009) (Appendix G). A VFD controller is used to control the discharge flow rate. The horizontal segment of discharge pipe, supported by Tolco pipe saddle supports, also contains a 4-inch, 45-degree ductile iron wye with a capped end. This wye provides an additional access point for maintenance or re-routing of flows if necessary.

Once past the flow meter, the 4-inch discharge pipe elbows down into the northeast manhole where it leaves the building and continues below-grade to the east. The northeast manhole also contains the 4-inch discharge line that leads directly to the BSB Sewage Treatment Plant. Each pipe has been labeled for easy identification. Labeling is consistent with BP Integrity Management (IM) standards, white lettering in blue background to indicate water conveyance system. Both 4-inch pipelines connect to the 6-inch PVC pipelines east of the concrete pad at WCP-1. The upper line (to BSB Sewage Treatment Plant) discharges through a 6-inch SDR 21 PVC force main. This line has been capped and is currently not in use.

The lower line (to the BTL) discharges through a 6-inch SDR 21 PVC force main. Each discharge line is buried approximately 6 feet below grade to protect from frost damage. The lines continue southeasterly for about 30 feet at a depth of approximately 6 feet bgs. The 2 lines turn south for approximately 21 feet and at that point the pipeline to the BSB-STP (east line) discharges into manhole EW-1. Water is conveyed from EW-1 through a 12-inch, gravity sewer pipe, beneath Centennial Avenue and the Silver Lake water line, and discharges to sewer manhole EW-2 and then to the sewer main at manhole EW-3.

The 6-inch pipeline to the BTL tees into the 8-inch high density polyethylene (HDPE) Missoula Gulch bypass pipeline north of Centennial Street. From that junction, water flows into a 15-inch HDPE pipeline that discharges into the HCC. A complete system water flow diagram is provided as Figure 2.

2.3.3 Missoula Gulch Base Flow System

Storm water flow within Missoula Gulch is controlled by two reservoirs (CB 8 and 9). Catch Basin 8 intercepts flow immediately south of the Iron Street/Excelsior Avenue intersection. Weir orifice plates regulate flow from CB-8. The plates are generally set at a constant elevation to retain as much flow as possible within the catch basin. If flow overtops the orifice plate, it is transferred to a concrete bypass structure. The concrete bypass structure is screened to reduce obstruction of the subsequent bypass pipeline. The bypass pipeline daylights immediately south of CB-8 where it distributes flow on a riprap-lined apron. If flows exceed the capacity of the concrete bypass structure and pipeline, they will crest the CB-8 spillway and disperse over the aforementioned riprap apron immediately south of the reservoir. From this point, surface water flow is channelized on the surface (with the exception of approximately 165 feet of buried culvert) until it reachesCB-9.

Catch Basin 9 is located immediately west of West Camp, and north of Centennial Avenue. Catch Basin 9 functions in the exact manner as CB-8 including the weir orifice plates, concrete bypass structure and pipeline, spillway, and riprapped apron. Excess flow from CB-9 is channelized until reaching the bypass line at Centennial Avenue. The bypass line passes under Centennial Avenue and then discharges to the BRW diversion channel. The diversion channel merges with the HCC, and the combined flow continues on to the BTL system.

2.4 Monitoring and System Controls

System monitoring is described in greater detail in Section 6.0 and in Section 8.1 of the *Draft Final Butte Treatment Lagoons (BTL) and West Camp Pump Station (WCP-1) Upgrades Design Report/Work Plan* (Atlantic Richfield Company, 2010).

Missoula Gulch is not regularly monitored with the exception of routine visual inspection to ensure that the intake screens of CB-8 and CB-9 are free of debris and each is functioning properly.

2.4.1 Water Level Monitoring

The objective of the pumping is to maintain water level in West Camp, as measured in the Travona Shaft, below the critical water level of elevation 5,435 feet amsl. Two Esterline KPSI Series 700 submersible level transducers and transmitters are installed in monitoring well BMF96-1D. Each water level meter includes a digital readout in the WCP-1 pump house and relays data to the Operations Building Control panel at LAO. The transducers utilize 4-20mA signal to relay level alarms to the Operations Building. High level alarm is set at 5,430 feet amsl and the low level alarm is set at 5,423 feet amsl. Data relays for the level transducers also include power and communication status alarms.

The system operator must verify calibration quarterly against the water level in the Travona Shaft (SOP pending, Appendix F).

2.4.2 Water Quality Monitoring

Water quality is monitored as a composite of the BTL influent. No independent monitoring is performed on West Camp by BTL operations personnel.

2.4.3 Flow Monitoring

A McCrometer UltraMag® electromagnetic model UM06, 4-inch flow meter (FE-WC101) located in the WCP precast building measures instantaneous discharge flow rate and total flow. Flow is checked two days per week by the site operator.

2.4.4 Additional Monitoring Components

Monitoring components associated with WCP-1 also include a Dwyer 2-inch SS Industrial Pressure Gauge (PI-WCP5013)(Model # SGB-C0421N), a Detcon Model TP-624C H_2S monitor (AIT-WCP5000) (Appendix G), and an AC power (on/off) indicator.

2.5 Electrical Systems

Commercial 480 VAC 3-phase 100-amp underground electrical power supplies the system at the southeast corner of the WCP-1 pump house. The power is used to directly power the pump motor following a 30 AMP 480 VAC 3-phase isolation breaker panel (EL-WCP50101). A 10-KVA transformer converts 480-volt 3-phase to 120-volt single-phase, which powers all other electrical devices in the system (see Appendix A, Drawings D46-15IN-023 through 029).

2.6 Backup Systems and Spare Parts

A backup pump and variable speed drive, extra Certa-Lok pipe (used for the pump discharge line), and other spare parts for both pump stations are stored at the BTL Operations Building within LAO. Critical spare parts necessary to ensure the WCP-1 is not inoperable for an extended period are stored at the BTL Operations Building within LAO. Based upon the availability of replacement parts, and groundwater storage capacity available, a contingent back-up system is not available. A spare parts list, including critical spares is included in Table 1, and also maintained in Volume V, Maintenance Program.

2.6.1 Emergency Generator (U-WCP5010)

A Cummins (U-WCP5010) site-dedicated diesel generator provides emergency back-up electrical service. The all season generator is located adjacent to the WCP-1 pump house on a concrete pad and hard-wired directly to the electrical supply system. An automatic control switch activates the generator in the event of a power outage. The transformer, automatic transfer switch, and main meter base and service are mounted on the south exterior wall of the building. All other electrical items, including the Cutler-Hammer panel board, are mounted on the interior of the building. Wiring is protected within schedule 40 PVC (or greater) or liquid tight flex conduit.

3.0 SYSTEM CONTROLS

The following section provides information detailing the controls and methods available to manage water level associated with West Camp.

3.1 Hydraulic Control

3.1.1 Pump Controls

A VFD mounted on the south wall of the WCP-1 pump house operates the extraction pump. The pump runs on 3-phase, 480-volt, 60-hertz electrical power. Turning the main switch lever to the "on" position and depressing the start button starts the pump. The controller is equipped with heaters that break the circuit if there is too large an amperage draw. The controller has a reset button that allows restarting the pump after an automatic or manual shutdown. The VFD controller regulates the discharge flow from WCP-1. Programmable logic is used to control the pump motor speed through the VFD. The logic allows frequency modulation to vary the pumping rate slightly which in turn maintains nearly constant level in the well. Operator control of the pump is not required. Control is achieved though changing the setpoint, or desired operating level range within the well.

3.1.2 Valving

The only valve located in the pump house is the 4-inch Mueller LINESEAL® butterfly valve (BFV-WCP-5009). This valve is located on the discharge pipe (4″-UW-P2-WCP5001) that leads to the BTL. The valves primary function is to isolate and stop flow from the pump to the BTL. Primary flow control is achieved through controlling the speed of the pump using the VFD. In the event of automated control failure, flow control can also be achieved through throttling of valve BFV-WCP5009. Flow throttling is achieved through either opening or closing the valve to set flow rate at the desired value indicated on the flow meter readout.

The submersible pump should never be operated with the gate valve closed, i.e. pumping against "dead head," as the flow of water past the pump cools the pump motor. The pump motor manufacturer recommends a minimum discharge rate of 70 gpm, which will create a flow velocity of approximately 0.75 feet/second around the motor, and will ensure proper cooling. According to the manufacturer's data, the best efficient pumping point is at discharge rate of 250 gpm (see Appendix G). The recommended operating range of this pump model is 70 to 300 gpm. This range is consistent with the actual pumping rates. The overall weight of the pump is approximately 44 pounds.

3.1.3 Missoula Gulch Catch Basins, Weir Plates, and Bypass Structures and Pipelines

Storm water flow within Missoula Gulch is controlled by two reservoirs (CB 8 and 9). Catch Basin 8 intercepts flow immediately south of the Iron Street/Excelsior Avenue intersection. Weir orifice plates regulate flow from CB-8. The plates are generally set at a constant elevation to retain as much flow as possible within the catch basin. If flow overtops the orifice plate, it is transferred to a concrete bypass structure. The concrete bypass structure is screened to capture

debris and reduce obstruction of the subsequent bypass pipeline. The bypass pipeline daylights immediately south of CB-8 distributing flow on a riprap-lined apron. If flows exceed the capacity of the concrete bypass structure and pipeline, they will crest the CB-8 spillway and disperse over the aforementioned riprap apron immediately south of the reservoir. From this point, surface water flow is channelized on the surface (with the exception of approximately 165 feet of buried culvert) until it reaches CB-9.

Catch Basin 9 is located immediately west of West Camp, and north of Centennial Avenue. Catch Basin 9 functions in the exact manner as CB-8 including the weir orifice plates, concrete bypass structure and pipeline, spillway, and riprapped apron. Excess flow from CB-9 is channelized until reaching the bypass line at Centennial Avenue. The bypass line passes under Centennial Avenue, transects the BRW open areas, and eventually discharges to the BRW diversion channel. The diversion channel merges with the HCC, and the combined flow continues on to the BTL system.

3.1.4 Routine System Hydraulic Operations

During routine system hydraulic operations, the groundwater level of the West Camp will remain at or below 5,425 feet amsl. This level is established to maintain a 10-foot buffer elevation from the critical water level of 5,435 feet amsl. Routine operations maintain the water level at or near 5,424 feet amsl. Pumping rates from WCP-1 average 180 gpm over the course of the year. Discharge water is conveyed from WCP-1 and combines with base flow from Missoula Gulch prior to discharging to the HCC. After reaching the HCC, the discharge water travels westward where it eventually enters Cell D4 of the BTL system. It is then treated in the BTL and eventually discharged to Silver Bow Creek. The WCP-1 level is maintained nearly constant through the use of a VFD which controls pump motor speed based on well level. Operator interaction, or manual throttling, is minimal under routine conditions.

The maximum baseflow from the Missoula Gulch is 75 gpm. Although this flow varies with the conditions in the Missoula Gulch channels and intake screens, routine flows are approximately 50 gpm. Flow from the Missoula Gulch system discharge directly to the BRW diversion channel, and later merge with the HCC prior to entering the BTL system.

3.2 Electrical, Automation Control, and Monitoring

This section of the O&M Plan provides a general description of the electrical systems at the WCP pump house. The West Camp piping and instrumentation diagram (P&ID), Sheet I&C-C-6, is located in the System Drawings in Appendix A.

3.2.1 Electrical Service Equipment

A schematic diagram of the main electrical system is provided in the System Drawings (Appendix A). The 480-volt service panel contains circuit breakers to prevent overheating or damage to the equipment in case of a short in the system. A 480-volt line runs directly to the pump controller. The pump controller is used to start, run, or stop the 15-HP pump. The controller also has “heaters” which will break the circuit if the wiring is beginning to overheat.

A transformer converts the 480-volt, 3-phase power to 120-volt, single-phase power. The 120-volt power is used to run the lights, fan, aeration blower, security system, water level monitors, flow meter readout, and the data/communications system.

3.2.2 Automation Control Equipment

MSE Tetragenics automation control equipment is located on the east wall of the WCP-1 pump house. The automation and control equipment includes an Allen-Bradley CompactLogix Programmable Logic Controller (PLC) with distributed in/out and control base. Wonderware operating software is utilized to provide operating control over the system. The interface logs all data from the flow meter and pressure gauge and transmits that data to the BTL Operations Building via the secure Federal Communications Commission (FCC) radio signal utilizing Integra-H 900MHz wireless modem and Maxrad 900MHz Yagi Antennae.

3.2.2.1 Wonderware HMI Data Management Software

The Wonderware HMI System is installed on the computer located in the new Operations Building at BTL-LAO, adjacent to the CAS Building. This system compiles all remote facility location data in an electronic format that is readily available to the operator. The data can be used to verify real-time performance and operation of the systems.

3.2.3 Monitoring Equipment

Monitoring equipment within the WCP-1 pump house is directly connected to the HMI automation control equipment. This allows for data transmission to the BTL Operations Building. The system is capable of notifying the operator of any upset conditions at WCP-1. Monitoring equipment at WCP-1 includes two groundwater level sensors, the McCrometer UltraMag® flow meter, Detcon H_2S sensor, and power interruption/supply sensor. Local indication of process conditions is available through the Dwyer pressure gauge installed within the discharge piping, and local flow display on the flow meter. No water quality monitoring devices are located within the WCP pump house. Water quality parameters are measured by grab sample collection at West Camp on a quarterly basis.

3.2.3.1 Esterline KPSI Water Level Transducer (LT-WCP5001)

Digital submersible transducers and transmitters are installed in monitoring well BMF96-1D. Each water level meter provides a digital readout in the pump house and data relays to the Operations Building control panel. The level transducers utilize a 4-20 mA signal to relay level alarms to the Operations Building; the high level alarm is set at 5,430.00 feet amsl and the low level alarm is set at 5,423.00 feet amsl. Data relays for the level transducers also include power and communication status alarms.

3.2.3.2 McCrometer UltraMag® Flow Meter (FIT-WCP5006)

West Camp flow is monitored using a McCrometer UltraMag® model UM06, electromagnetic inline, full bore flow meter suitable for the measurement of electrically conductive fluids and slurries. A magnetic flowmeter measures flow based upon Faraday's Law to measure flow in a pipeline. A voltage induced across any conductor (fluid) as it moves at right angles through a

magnetic field is proportional to the velocity of that conductor. Signal voltage is dependent on the average liquid velocity, the magnetic field strength, and the length of the conductor (which in this instance is the distance between the electrodes). A magmeter cannot distinguish entrained air from the process fluid; therefore, air bubbles will cause the magmeter to read high. To remedy this, the meter is installed horizontally, at a lower centerline than the centerline of the supply piping to ensure the meter is constantly flooded. The meter is constructed of a 4-inch diameter body with 4-inch flanged ends (ASME B16.5, Class 125, flat-faced), and installed directly in the pipeline. Instant flow readout is available locally at the meter and remotely at the main panel in the BTL- LAO Operations Building.

3.2.3.3 Dwyer Pressure Gauge (PI-WCP5013)

The pressure indicating gauge is a Dwyer SGB-C0421N model, constructed with 304 SS housing and 316 SS wetted parts, glass lens, and a 1/8-inch MNPT process connection. The gauge is suitable for process conditions of 0 to 60 pounds per square inch gauge (psig) operating pressure, ambient temperatures of -4 degrees Fahrenheit (°F) to 140°F (60 degrees Celsius [°C]) and process temperatures up to 356°F (180 °C). The face is a 2-inch diameter display with both English and metric units. The unit enclosure rating is NEMA 3, rated to 125% of process pressure, or 75 pounds per square inch (psi).

3.2.3.4 Detcon H_2S Sensor (AIT-WCP5000)

The H_2S sensor is a Detcon MicroSafe™ Model TP-624C, hydrogen sulfide sensor is a non-intrusive "Smart" sensors designed to detect and monitor H_2S in the air. Ranges of detection are user-settable between 0 to 20 parts per million (ppm), 0 to 50 ppm, and 0 to 100 ppm. The automatic calibration feature guides the user through each step via instructions displayed on the backlit LCD. The sensor features field adjustable, fully programmable alarms, relays for two gas level alarms, and one for any fault condition. The sensor is equipped with both an analog 4-20 mA, and serial RS-485 output.

The sensor is packaged in a cast metal explosion proof enclosure, fitted with a threaded cover that has a glass lens window. Magnetic program switches located behind the transmitter module face plate are activated through the lens window via a hand-held magnetic programming tool allowing non-intrusive operator interface with the sensor. All calibration and alarm level adjustments can be accomplished without removing the cover or declassifying the area. Electrical classification is Class I; Division 1; Groups B, C, D (explosion proof).

3.3 Instrumentation and Controls Operational Control Theory

The pump house is equipped with Allen Bradley CompactLogix PLC with distributed in/out and control base to monitor and control sites process and/or monitoring equipment. The site PLC provides local control such as pump control logic or flow control logic, and monitors the local process for any alarm status such as loss of power, pump failure, instrument failure, and high/low level or flows. Data and site system status are collected by the Allen Bradley CompactLogix PLC and transmitted via encrypted FCC radio to the Allen Bradley ControlLogix PLC at the Operations Building. The Master PLC at the Operations Building polls remote sites for data at regularly scheduled intervals. Polling intervals are programmable and can be set to meet data acquisition requirements.

3.4 Protective System Devices

Protective System Devices include any device installed to protect personnel, the environment, or equipment. These devices act either independently or through control logic to shutdown equipment, relieve pressure, or isolate energy. Such devices may include level and pressure switches, relief valves, regulators, or instrumentation and control logic.

Protective System Devices protect the environment, system components, and personnel by activating alarms and notifying personnel when process conditions are outside normal operating parameters. If normal operations are upset and key parameters are out of range (e.g., power loss, pump stoppage, water level elevation, high H_2S in the building, etc.) the monitoring equipment will transmit an alarm signal to the monitoring system at the BTL, which initiates an automatic callout procedure to contact the operator.

3.4.1 PSD List

A list of protective safety devices for West Camp is provided below.

Type	Tag number	Instrument Description
Water lever	LT-WCP-5001	Level Indicator Controller
H_2S monitor	AIT-WCP-5000	H_2S Safety Area Monitor
Loss of power	TBD	Power Interruption/Supply Sensor
Check-valve	VRV-WCP101	1" PVC Air Relief Valve

4.0 SAFE OPERATING LIMITS

The following provides maximum allowable limits of process conditions to prevent damage to process equipment, personnel, and subsequent release to the environment. Line classes are established by safe operating pressure and temperature based upon the pipe material and size.

4.1 Pressure

System operating pressure will not exceed 60 psig. Low pressure will not be less than atmospheric. Pressure components are not rated to maintain vacuum, or pressure less than atmospheric. Piping and components are rated to 200 psig at 100 °F. Instruments and gauges installed in pressurized systems are rated to 75 psig (125% operating pressure) at 100 °F.

4.2 Temperature

4.2.1 Groundwater

Temperature of the groundwater is typically within the range of 42 – 47 °F.

4.2.2 Pump House

Temperature within the pump house is maintained in the range of 55 to 75 °F.

4.2.3 Ambient

Ambient temperatures range from -40 to 110 °F.

4.3 Flow Capacity

System flow capacity shall not exceed 300 gpm. Minimum flow will not be less than 70 gpm to provide adequate cooling to the pump.

4.4 Electrical

The main electrical service line is rated to provide 100 amps. Major pieces of equipment are powered on an independent circuit and protected with an over-current circuit breaker.

Electrical enclosures will be tested according to Underwriters Laboratories (UL), and rated to meet National Electrical Manufacturers' Association requirements. Enclosure types are listed below for each instrument. Electrical wiring shall contain be THHN type insulation, rated for maximum current overload at a temperature up to 194 °F.

4.4.1 Instruments

UltraMag UM06 flow meter operating range includes:

- Temperature: 14 to 170 °F;

- Pressure: 0 to 150 psig (maximum allowable pressure); and
- Enclosure: NEMA 4X.

DetCon H_2S gas meter operating range includes:

- Temperature: -40 to 175 °F;
- Pressure: atmospheric; and
- Enclosure: NEMA 7.

Dwyer pressure gauge operating range includes:

- Temperature: 14 to 140 °F;
- Pressure Range: 0 – 60psig;
- Pressure Limit: 125% full scale range; and
- Enclosure: NEMA 3.

WEG VFD operating range includes:

- Ambient Temperature: 14 to 122 °F;
- Altitude: No current de-rating required up to 13,100 feet (4,000 meters); and
- Enclosure: NEMA 3R.

KPSI level transducers operating range includes:

- Ambient Temperature: -4 to 140 °F;
- Pressure: 10 – 200 feet H_2O hydrostatic pressure head; and
- Enclosure: NEMA 6P.

5.0 ROUTINE OPERATIONAL TASKS

Routine operating functions and parameters are recorded by the operator on a log sheet. The operator must obtain a new log sheet at the beginning of each week. Measurements are made and recorded, and then the data are transferred to a database for retention. The log sheet also serves as a punch list of operating activities that must be performed and when the activity must be completed. Notes and observations of the systems and site are also made on this sheet. A blank BTL-LAO Operations Log Sheet is available in Appendix D.

Proper system operation includes routine minor maintenance and inspection of the site, equipment, and process parameters. Routine maintenance involves the use of sight, sound, and touch. Operators must take the time to notice changes in system operating parameters, and associated components. Operations logs and field notes are helpful in diagnosing system upsets.

Routine tasks are included in Appendix D. The operator's reference guide provides items that must be performed on a regular basis and scheduled intervals. Predictive and preventative equipment maintenance tasks are discussed in Volume V, Maintenance. Topics included in Volume V are equipment repairs, replacement, upgrades, maintenance schedules, and equipment inventories. Non-routine maintenance procedures are also included.

5.1 Normal Operation

Under normal operations the objective of the groundwater extraction system is to maintain water levels in the West Camp below an elevation of 5,425 feet amsl, which is the critical water level (5,435 amsl) plus a 10-foot buffer. Normal operation of WCP-1 maintains water level at or near 5,423 feet amsl. During normal operations, an operator must visit the site twice weekly. During site visits, the operator will record instantaneous flow reading, and totalized flow.

The pumping rate is controlled by the VFD to maintain a constant water level. The VFD receives a signal based on well level to vary the pump motor speed in order to maintain a constant level. Should the pump rate require manual throttling, the pump operates at full rated capacity and the inline 4-inch butterfly valve will be adjusted to the following flow rates: during non-recharge periods the pumping rate is typically set between 150 and 180 gpm; and during periods of annual recharge the pumping rate is increased to between 200 and 240 gpm.

If normal operations are upset and key parameters are out of range (e.g., power loss, pump stoppage, water level elevation, high H_2S in the building, etc.) the monitoring equipment will transmit an alarm signal to the monitoring system panel located at the BTL Operations Building, which will ultimately notify the operator of the condition.

5.1.1 Start-Up

The following sequence is provided to initiate or restore pumping operations at P-WCP-1.

Upon arrival at the site and initial site inspection, and entry into the pumphouse:

1. Verify BFV-WCP5009 is open.

2. Verify Panel EL-WCP-105 is energized. Main switch should be in the ON position.

3. Move pump power control Hand/Off/Auto (HOA) switch to the AUTO position.

4. Push and hold reset button for 1-second.

5. Push and hold START & BYPASS button to energize pump.

6. Verify the pump flow rate displayed on FE-WC-101.

7. Record the date, time the system is brought back online and flow rate of the system.

5.2 Routine Operations Tasks

Several scheduled tasks should be completed during routine operations to ensure continued operational efficiency of the Missoula Gulch Groundwater System and West Camp. Routine measurements are recorded on the BTL-LAO Weekly Ops Report, provided in Appendix D. Routine inspection and maintenance tasks and frequencies are summarized in Operator's West Camp Reference Guide and West Camp Maintenance and Inspections Checklist, available in Appendix D.

5.2.1 Missoula Gulch Baseflow Collection System

Butte-Silver Bow personnel are responsible for maintenance of the Missoula Gulch base flow system. These tasks are listed here to provide an overview of all tasks associated with West Camp. Routine operational tasks associated with the Missoula Gulch base flow system include weekly site visits to inspect the condition weir orifice plates, base flow pipeline inlet screen, concrete bypass structures, bypass pipelines, spillways, and containment dikes. Any variance in the condition of site features that may result in upset operational conditions should be documented and repaired immediately. When on-site, any debris that may have accumulated around the weir, the debris screen, or on the spillway should be collected and removed from the site. Surface channels should be walked and inspected yearly. Any obstructions (tree limbs or trash) should be removed from the channel and the site. Exposed portions of the bypass pipeline should be walked yearly to check for leaks, fissures, or other damage. Damage should be documented, marked, and repaired as soon as practical.

5.2.2 West Camp Pump Station

The water level, flow rate, and system pressure is checked twice per week at WCP-1. It is essential that the water level be maintained at or below the critical water level of 5,435 feet amsl. The operator will physically record all values weekly and ensure that data loggers and monitoring equipment are operating as designed and intended. These site visit intervals are typically every Monday and Thursday. Site alarms necessitate additional site investigations. Site alarms include: H_2S detection, well level high and low, discharge flow out of range, and generator alarms.

5.2.3 Routine Maintenance

Routine operational maintenance items are listed on the BTL-LAO Operations Log sheet. Task description and frequency is also available in Appendix D, the Operator's West Camp Reference Guide. The checklist is completed each day the operator visits the site. As previously stated, the site is visited twice per week under normal operating conditions.

5.3 Site Vegetation and Access Maintenance

5.3.1 Site Vegetation Maintenance

The Butte Reclamation Evaluation System (BRES), contained in the *Record of Decision Butte Priority Soils Operable Unit Silver Bow Creek/Butte Area NPL Site* (ROD) (EPA, 2006), establishes the performance standard for site vegetation (see Volume I, Performance Standards). The system was specifically designed for use in the upland environment of Butte, but may also be re-evaluated, altered, and used appropriately for BPSOU and BMFOU. The BRES has components that allow it to be applied to areas reclaimed as open space within this area. Reclaimed areas, including cover soil caps, must achieve the proposed performance standards described by EPA in the BRES document. This system is a site-specific tool to evaluate the stability, integrity, and degree of human and environmental protectiveness afforded by response actions initiated on lands impacted by mining within the OUs.

The BRES relies on routine inspections to assess the following reclamation characteristics:

- Condition and diversity of vegetative cover;
- Presence of erosion;
- Condition of site edges;
- Presence of exposed waste material;
- Presence of bulk soil failure or mass instability; and
- Presence of barren areas or gullies.

Based on the periodic monitoring (as observed by the operator and staff) and evaluation of response action sites, the triggers noted above will prompt corrective action. Vegetated cover must support a diverse plant community including native species to the extent that the constituents of the vegetation cover are not incompatible with the remedy or overall performance standards.

5.3.2 Site Access Maintenance

The West Camp is accessed via a gravel road from Centennial Avenue. The access road is several hundred feet long. A chain-link fence with locked gates secures the West Camp facility. The road and parking areas should be regularly maintained, including grading and addition of surfacing materials when needed. Site drainage features (borrow pits) adjacent to the roadway must also be maintained to promote the removal of excess surface water. This includes mowing and removal of obstructions from the channels and from any culverts.

The chain-link fence and locking gates must also be regularly checked to ensure site security. If any damage or vandalism should occur to the fence or gates, immediate repair actions should be undertaken to maintain site integrity.

5.4 Routine Operations Duties and Responsibilities

Routine Tasks: Perform the sampling and data gathering tasks listed on the BLT-LAO Weekly Ops report at a frequency of twice per week. Tasks for the West Camp are typically performed every Monday and Thursday. Complete West Camp Maintenance and Inspection Checklist form, each day the site is visited.

Maintenance: Routine maintenance involves visual inspection and observation of the site upon arrival. Inspection includes general observations of site security, fencing, gates, and locks. Also included is basic observation of pipes, fittings, and equipment for signs of leakage or degradation.

Weekly Inspection: Inspect back-up generator systems, fluid levels, hoses, and hour meter. Record hour-meter readings to verify generator automatic start-up.

Bi-weekly Maintenance: Visual inspection/observation of pipe and fittings. Note signs of leakage, and schedule repairs.

Monthly: Perform H_2S low flow alarm test.

Quarterly Maintenance: Water level in WCP-1 must be manually verified and recorded on a frequency of once per three-month interval, and a minimum of four times per calendar year. Obtain, record, and compare water level reading to the reading of the display on the Wonderware display monitor for the site.

Also included in the quarterly maintenance is inspection of site erosion, fencing, corners, pipe and fittings. Critical inspection should be performed on of pipe and fittings that are exposed to direct sunlight and ambient conditions. Look for signs of excessive deterioration, cracking, and joint failure.

Protective System Devices must be inspected, tested, and recorded. A list of system PSDs is provided in Appendix E.

Semi-annual: Perform preventative maintenance on building exhaust fan.

Annually: Look for signs of road and culvert maintenance needs, and weed control. Inspect all electrical insulation, wire covering, conduit, junction boxes, etc. for signs of degradation. The flow meter must be inspected and preventative maintenance performed annually. Refer to the Maintenance Manual, Volume V, for meter calibration procedures.

The following subsections provide instructions for routine, recurring tasks associated with West Camp. Operators are required to be appropriately trained on each procedure prior to performing these tasks. Refer to the appropriate SOP for HSSE considerations, personal protective equipment (PPE) requirements, required tools, and detailed work instructions (see Appendix F).

5.4.1 West Camp Check – SOP-4

The West Camp pumping station requires a weekly Operations Check to insure every component is working properly and information is accurately being gathered. During the weekly check, the following tasks must be completed:

1. Check the HMI for indication of any alarm conditions. Alarms for the WCP-1 are also sent via radio signal to the Wonderware system located in the CAS Building at the BTL. Alarms monitored at WCP-1 are water elevation, electrical service status, and flow rate. If any indication of alarms exists a further check at the WCP-1 is required to verify, identify, and correct alarm.

2. Before entering site, visually inspect the condition of the security fence and gate and exterior of WCP-1 pump house. If conditions appear normal, operator may enter site. If visual inspection shows signs of damage or security gate is open, operator may notify the respective pioneer contact or call 911 if needed.

3. Upon entrance of WCP-1 pump house, check the flow meter (FIT-WCP-5008), sound emitting from flow in the 4-inch DI pipe (4″-DI-WC001), and the Level Controller (LI-WCP-5001). No flow, no sound emitted from water flowing through the 4-inch pipe (4”-DI-WC001), or no light displayed on the Level Controller (LI-WCP-5001) indicates alarm conditions; routine conditions are indicated by flow, sound emitting from the 4-inch DI pipe (4”-DI-WC001), or light displayed on the Level Controller. If no alarm conditions exist proceed with SOP-4, Step #5 and Step #6.

4. If electrical service has been disrupted the operator will determine if it is within operator controls to restore power.

    a. If within operator control operator will restore power; and
    b. If not within operator controls, the operator will contact NorthWestern Energy to have electrical service restored.

5. Once electrical service is restored, the pump must be reset to routine operation. A push button reset switch located on the pump Control panel must be reset. Once reset, the pump auto start button may be depressed.

6. Adjust flow rate as necessary to maintain, lower, or increase the water elevation in the West Camp/Travona Mine complex. Flow rate is adjusted through modulation of the motor VFD.

7. Measure required daily parameters associated with WCP-1 and record accordingly on BTL-LAO Operations Log.

The complete SOP-4 West Camp Check is available in Appendix F.

5.4.2 Water Level Measurement Procedure

Manual water level measurements are required to verify level transducer readings. Operators will place the manual level measurement device down the well until water level is reached. Measurement is made by taking a level reading at the control mark placed on the north side of the well casing. Record the level, and verify the automated measurement reading.

5.4.3 Alarm Response Procedure

The RACO auto-dialer provides notification to the operator upon prolonged upset conditions. The dialer is pre-programmed to mitigate nuisance call-outs and prioritizes callouts to ensure high impact conditions are corrected quickly. Upon notification the operator must initially respond to the operator interface panel in the Chemical Addition System (CAS) building, at LAO and investigate the nature of the alarm via the HMI terminal. The HMI monitor provides indication of the alarm area, and nature of the alarm. The operator s then required to physically investigate the local alarm area and physically correct the situation to remedy the alarm situation.

5.5 Seasonal Flows

Seasonal flow adjustments can be expected to account for precipitation events or non-typical precipitation years. (A range of seasonal flow rates will be generated and placed in the Appendices for adjustment guidance.)

6.0 OPERATION DURING DISTURBANCES

This section describes the procedures to be implemented in the event that operation of the WCP-1 is interrupted. Previous hydraulic recharge tests have been completed to estimate the amount of downtime allowable before critical water level is achieved. Based on an operating water level of 5,424 feet amsl, and normal recharge rate of approximately 150 gpm, WCP-1 can remain inoperable for up to 12 days, resulting in an expected level increase of nearly 6 feet. After a 12-day period water level would raise to approximately 5,430 feet amsl. The high level alarm setpoint for this system is 5,430 feet amsl, which provides a 5-foot buffer below critical water level. Normal recharge rate will cause water level to rise approximately .49 feet per day without pump operation.

6.1 System Disturbances

Interruptions to the West Camp that would trigger the implementation of this contingency plan include, but are not necessarily limited to the following:

1. Loss of power;
2. Monitoring equipment disturbance;
3. Control and instrumentation disturbance;
4. Pump failure;
5. Missoula Gulch flow disturbance;
6. Subsurface changes that result in loss of effectiveness of well system; and
7. Pipeline damage between West Camp and the treatment lagoons.

System repairs and upsets will be considered and addressed on a case-by-case basis. Figure 3 West Camp Decision Tree, WCP-DT-1, presents the corrective actions for troubleshooting various upset conditions at West Camp. During an interruption to the West Camp groundwater extraction system, the following procedures will be implemented to address the system.

6.1.1 Electrical Disturbance

In the past the principal upset to the system has been shutdowns caused by the local utilities electrical surges or outage. If a power outage occurs at the West Camp Pumping Station first check to see if a breaker has been tripped. If a breaker has been tripped reset the breaker and visually inspect all electrical systems to ensure that all wiring is in good condition. If a breaker has not been tripped then notify the local utility of the power outage. Power outages should be reported to NorthWestern Energy at 1-888-467-2353.

A Cummins site-dedicated diesel generator provides supplemental electrical service. The all-season generator with dual containment fuel tank is located adjacent to the south side of the WCP-1pump house on a dedicated concrete pad and hard-wired directly to the electrical supply system. The generator is activated by an automatic control switch in the event of power outages. The automatic transfer switch continuously monitors line voltage from the utility. If line voltage drops below a certain level (volts, or Δ phase) the transfer switch signals the generator to start and then transfers power to the backup. The power switch takes approximately 10 seconds (need data from Cummins). An uninterrupted power supply (UPS) system installed in all PLC panels

accounts for this gap. The battery life for the CAS is 7 to 10 minutes at full load of about 7A. The generator transfer will be monitored. If line power or backup power is not online an alarm call out (primary) will take place. The transformer, automatic transfer switch, and main meter base and service are mounted on the south exterior wall of the building.

In this manner, the water elevation in the extraction well will be maintained. Following utility maintenance, the system is to be reconnected to the municipal power supply, brought back online and the generator unit shutdown. Once electrical service is restored, the operator will ensure WCP-1 returns to routine operating conditions.

6.1.2 Monitoring Equipment Disturbance

Upon discovery of the failure of the West Camp, the operator will initially check and record the water level at the West Camp to verify the water level is below the critical water level of 5,435 feet. If water levels are below critical levels, begin troubleshooting (see Figure 3, WCP-DT-1) to determine the cause of the West Camp failure and appropriate corrective action. Check and record water levels daily during the failure until the system is repaired and operating normally again.

(**NOTE:** Based on typical operating levels per this Manual, it is expected to take approximately 21-days for water levels to reach critical levels identified by BMFOU requirements. Continue to monitor water levels.)

6.1.3 Control and Instrumentation Disturbance

If control and instrumentation devices are disrupted, begin manually recording data daily (including water levels, flow rates, pressure readings, and H_2S levels). Utilize BFV-WCP-5009 to control the pumping rate from WCP-1. The valve will be manually adjusted to achieve a constant level in well BMF96-1D. Refer to the seasonal pumping rate chart (Appendix I) for an initial flow range. Manual measurements will be obtained and recorded daily until the disturbance is corrected.

Immediately contact MSE Tetragenics (406) 533-6800 to service the equipment and notify the BTL-LAO Project Manager. Ensure that routine pumping and flow conditions are maintained by performing manual adjustment if necessary. Following repair, ensure that all equipment is functioning appropriately; including logging of data and transmittance to the HMI automated data system at the Operations Building.

6.1.4 West Camp Pump Disturbance

After establishing that groundwater levels are below specified action levels, the operator will begin troubleshooting to identify the cause of the West Camp system failure. Refer to Figure 3, Corrective Action and Troubleshooting Decision Tree for troubleshooting assistance. It will take approximately 3 weeks for groundwater levels to rise above action levels, therefore the operator will strive to identify and fix the cause of the failure before groundwater reaches this level.

The most difficult upset condition to manage would be caused by excessive water level rise resulting from above average annual precipitation and/or recharge in West Camp. The extraction

system's output capacity is limited by the its pumping capacity and the amount of water that can be treated at the BTL. West Camp has the capacity to deliver up to 300 gpm to BTL.

According to the *Sampling and Analysis Plan for Field-Scale Treatability Study Base Flow and West Camp Water Work Plan* (AERL, 2001), the BTL is expected to accept approximately 180 gpm from WCP-1. The piping in the BTL system is designed to handle more than 400 gpm from WCP-1. The maximum acceptable flow rate from WCP-1 is based on treatment capacity of LAO.

Discharge from WCP-1 to LAO is best managed by using the best available predictions of the regional water balance, much the same as is done with reservoir management. During years when the winter and spring snow pack are well above normal the regional recharge will be high. During these conditions the water levels in the West Camp should be drawn down to increase the buffer from 10 to up to 20 feet (elevation 5,215 feet amsl). This will provide added storage in the aquifer and underground mine system. Climatic predictions can be accessed through the Natural Resource and Conservation Service to aid in long-term planning of the West Camp pump rates. Appendix I contains seasonal pumping capacity recommendations.

In the event of pump failure, a redundant pump and variable speed drive is maintained in the West Camp equipment inventory (see Appendix E). In the event of pump failure, the operator will initiate the steps required to replace the pump with the pump located in inventory. This replacement will be a replacement-in-kind.

6.1.5 Missoula Gulch Flow Disturbance

Butte-Silver Bow personnel are responsible for maintenance of the Missoula Gulch base flow system. These tasks are listed here to provide an overview of all tasks associated with the West Camp. Missoula Gulch Flow may be disturbed during abnormally high flow conditions, failure of flow regulation devices or containment structures, or plugging of discharge piping. During high flow conditions water will accumulate within and eventually overtop the spillway of CB-8. The excess flow will then travel downhill to CB-9 and eventually discharge to the BRW diversion channel.

Immediate dewatering efforts must be implemented should a breach occur in either containment dike of CB-8 or CB-9. Water may be discharged directly to the Missoula Gulch drainage. Damage is then to be assessed and corrective reconstruction measures implemented.

In the event that flow control structures fail or malfunction, they will be repaired or replaced as needed. If plugging of discharge piping occurs, attempt to physically remove the obstruction in a safe manner. If the operator is unable to safely remove the obstruction proceed to mechanical pigging or flushing actions.

Maintenance of the Missoula Gulch bypass should be completed as needed. Including repairing any leaks or needed replacement of any corrugated metal pipe segments.

6.2 Off-Site and Environmental Disturbances

Possibilities exist that off-site or environmental disturbances may impact routine operations of West Camp and Missoula Gulch. Off-site disturbances may include nearby civil or residential construction, including utility installation, road improvements, and residential development. Additional off-site disturbances may include the disturbance or failure of other water collection and treatment systems associated with West Camp and Missoula Gulch, including the BTL, Metro Storm Drain (MSD), or CAS. General off-site construction will likely be foreseen or known of prior to it beginning. The operator will assess the possible impacts of the off-site event, and prepare for any foreseeable operational disturbances. The operator must coordinate efforts with the entity performing off-site construction/disturbance in order to fully address the situation. Accounting for possible disturbances and implementing the appropriate system adjustments will help in maintaining successful operation of the system.

Environmental factors that may affect routine operations include significant storm events, spring run-off, freeze and thaw events, and extreme drought. These events are generally unpredictable. The operator has the ability to vary WCP-1 pumping rates and to vary the amount of water retained or released from Missoula Gulch. Prior to increasing pumping rates (if groundwater levels are nearing the critical water level) or releasing excess water from Missoula Gulch, the operator must ensure that receiving facilities (BTL and/or BSB Sewage Treatment Plant) have sufficient capacity to accommodate the increased flow. The operator will return the systems to routine conditions as soon as practical following an environmental disturbance.

6.3 Return From Disturbances

After prolonged periods of shutdown, the accumulated water level must be returned to normal operating conditions. The pumping rate from WCP-1 is dependent upon the current operating levels and capacity at LAO. The estimated time required to return West Camp to normal operating level is also provided in Appendix I. The information in Appendix I provides an estimate of the length of time it may require to return to normal operating based on pre-shutdown pumping rate. To mitigate operational issues at LAO, the post-disturbance pumping rate can be selected moderate treatment capacity at LAO.

7.0 MONITORING AND LABORATORY TESTING

The following sections describe monitoring equipment utilized to collect and relay operating data to the BTL Operations Building. Also discussed are operator duties and responsibilities. On a weekly basis, the operator will obtain a new BTL-LAO Weekly Operations worksheet and obtain the appropriate measurements from the designated locations. This referenced worksheet serves as the basis for daily, routine operation of the LAO system. The referenced worksheet contains data to be collected from locations outside of West Camp. This section describes data and monitoring equipment associated with West Camp.

7.1 Operator Observations

To facilitate data generation and minimize data gaps, collected data will be sorted into the following categories:

- Operator observations;
- Control system generated data;
- Automatic electronic monitoring data; and
- Water level, flow, and quality data.

Many of the routine activities involve data forms or checklists that the operator completes as he/she proceeds. Many of the routine operator activities and most of the unplanned activities involve observations that should be documented for future reference. Such observations may include general site condition and appearance, pressure and flow readings, and H_2S levels and other biological, chemical, or physical activities within or influencing West Camp. The operator is responsible for generating and recording both types of observations on a daily basis. This documentation provides a basis for report preparation and response to potential questions and/or refinement of operations. These operator observations are to be kept in an operator logbook maintained in such a way that another person can easily understand each entry.

7.2 Monitoring Components

Operation and performance of WCP-1 is monitored to ensure efficient operation, react to upsets, and to meet regulatory obligations.

System monitoring is broken into two sections as follows:

1. Individual Monitoring Components at the WCP-1; and
2. HMI System at the BTL Operations Building

The following monitoring components are a part of the WCP-1 monitoring system within the WCP pump house:

TAG NUMBER	TYPE	DESCRIPTION	LOW	HIGH	UNITS
AIT-WCP-5000	AI	H2S Sensor	TBD	TBD	ppm
LI-WCP-5001	AI	West Camp Well Level	0	35	Feet
HS-WCP-5004	DO	West Camp VFD Hand Control	NA	NA	NA
SIC-WCP-5003	AO	West Camp VFD Speed	0	100	%
FI-WCP-5008	AI	West Camp Station Flow	50	350	gpm
ZA-WCP-5010	DI	West Camp Generator Alarm	NA	NA	NA
ZI-WCP-5011	DI	West Camp Generator Run Status	NA	NA	NA
ZS-WCP-5012	DI	West Camp Transfer Switch Status	NA	NA	NA

A= Analog; D = Discrete; I = Input; O = Output

7.2.1 Water Level Monitoring

Water level in the Travona shaft is measured quarterly with an electric depth-to-groundwater tape. Water levels are measured from the measuring point marked on the north side of the steel casing by Montana Bureau of Mines and Geology (MBMG).

Water level at WCP-1 is monitored automatically in the vicinity of WCP-1 in BMF96-1D with an Esterline KPSI 700 (LI-WC101) level measurement system, which consists of two Series 700 submersible transmitters and pressure transducers. Water level is measured to the hundredth of a foot and referenced to elevation in feet amsl. Refer to Appendix G for the Manufacturer's Installation, Operation and Maintenance Manual.

The submersible transducers and transmitters are attached to the transmitter with 120 feet of polyurethane shielded electrical cable. The cable extends from the Esterline transducer, out of the pump house and into monitoring well BMF96-1D. The transmitter is set approximately 30 feet below the water level in BMF96-1D. The water level in BMF96-1D is approximately 40 feet below the measuring point on the well casing. Thus the transmitter is suspended in the monitoring well by approximately 70 feet of cable. Note that any kinks or nicks in the cable may allow water to seep into the cable, shorting out the transmitter. Also, the surface ends of the cable provide the transmitter with a reference to atmospheric pressure therefore they should not be sealed.

The water level elevation that is displayed on the transmitter (LI-WC101) (see Drawings for location) is adjusted to be equivalent to the water level elevation in the Travona Mine Shaft, not the water level in BMF96-1D. This is accomplished by adding 0.66 feet to the water level reading of the transmitter during calibration.

Readout display is four digits and is set to read to two decimal places. The water level elevation is determined by adding 5,400 to the readout. For example, when the display reads 24.75 it should be interpreted as a water level elevation of 5,424.75 feet amsl. Associated water level alarms are transmitted to the HMI System located at the BTL for further logging and notification to the BTL system operators.

7.2.2 Pump Flow Rate

Flow rate from WCP-1 is measured by a 4-inch UltraMag® Flow Meter (FE-WC101). The H_2S resistant flow meter measures flow through the system in gpm and total flow in hundreds of gallons. The flow meter is designed to accurately measure flows between 50 and 500 gpm. Flow through the system is recorded, stored and transmitted to the HMI computer. The flow rate and total flow through the system are checked and recorded manually during weekly inspections.

7.2.3 AC Power

Automated monitoring equipment within the WCP-1 pump house monitors the AC power supply. A "com fail" alarm detected by this system and transmitted to the HMI within the BTL will signify that AC power is not reaching the building. The RACO alarm dialer will then notify the operator via the alarm dialer.

7.2.4 WCP-1 Pump Status

WCP-1 pump status is monitored by the automated monitoring equipment. The flow rate from the WCP-1 is transmitted continuously to the HMI computer. A "low flow" alarm will notify the operators when the flow from the WCP-1 pump is below 70 gpm.

7.2.5 H_2S Concentration

The H_2S concentration inside the pump house is monitored by a Detcon Model TP-624C H_2S Sensor (U-WC101) installed on the south wall inside the pump house. A Detcon alarm light is installed on the southeast exterior corner of the pump house near the mandoor which allows access to the pumphouse. Refer to Drawing WCP-D-8 for sensor location in Appendix A. This location provides visual warning indication of the presence of H_2S gas prior to entry into the pump house. Refer to Appendix G for the Detcon User's Manual.

At the time of installation, the H_2S sensor was calibrated per the instructions in the Detcon User's Manual. Once installed, the unit should be calibrated every six months.

****Note: The H_2S sensor must be powered up for two hours prior to calibration.****

The Detcon H_2S Sensor is equipped with an internal alarm that will sound if the H_2S concentration inside the building is equal to or greater than 10 ppm. The acceptable ceiling concentration for an 8-hour exposure of H_2S is 20 ppm and the acceptable maximum above the ceiling is 50 ppm. The LEL for H_2S is 4.0% (40,000 ppm) and the UEL is 44.0%, both by volume.

****Note:** For reference, hydrogen sulfide levels monitored in the aeration stripper tank between June and October 1999, were found to be between 3 and 7 ppm. Additional monitoring conducted on November 11, 2008, resulted in no H_2S being detected within the pump house.******

If the alarm triggers, a beacon light mounted above the pump house provides a visual alarm of the excessive H_2S levels in the building.

7.2.6 Routine Inspection and Calibration of On-Site Monitoring Systems

The accuracy of the electronic monitoring systems requires inspections and regular calibration checks to ensure proper operation of the monitoring equipment. Operator attention to proper functioning of instruments is essential in order to provide accurate information on important West Camp operating parameters. The following paragraphs discuss various types of instrumentation, common problems associated with their operation and attention required by the operator to ensure proper function. Monitoring equipment will also require periodic, routine recalibration and maintenance as described in their individual O&M Manuals, which are included as appendices. Volume V also contains maintenance schedules and intervals.

7.3 Automatic Electronic Monitoring Data

Data such as flow rates, water levels and various other inputs are recorded on the treatment system computer located within the BTL Operations Building. The data can be accessed as necessary (via telephone/computer connection) for routine operation and troubleshooting. However, the predominant use of the data will be for review and analysis of the water collection and treatment effectiveness and to improve understanding of the factors that affect performance. Procedures for emergency conditions and troubleshooting guidance are included in Section 11.0.

7.4 Review of Monitoring Data for Operations

Monitoring data must be reviewed daily to ensure that the systems are operating appropriately and that the physical and chemical properties are within historic operational ranges. If significant variations are observed within the monitoring data the operator should determine the necessity of performing system maintenance or altering pumping rates and/or the treatment process.

7.5 Routine Sampling Tasks

Routine sampling tasks are conducted by others. For further information, refer to the *Montana Bureau of Mines and Geology Sampling and Analysis Plan* (MBMG, 2004) which was prepared under the *Butte Mine Flooding Consent Decree #02-35-BU-SHE, Docket # CERCLA-VII-96-19* (EPA, 2002).

8.0 DATA MANAGEMENT

Data are generated from automated data loggers and manual field measurements. Data management for each type data collection is discussed.

8.1 Data Management Plan

The BPSOU Data Management Plan will outline the methodology and associated contents relevant to efficiently obtaining, documenting, and presenting pertinent operational data. The BPSOU Data Management Plan is under development as a separate document.

8.2 Automated Data Management

Selected data from the remote stations and from the CAS Building is logged and archived on 30-second and 1-hour intervals by the HMI. The recorded points are placed into a comma delimited file format and delivered to Pioneer. The 30-second file is then used to update the LAO Lagoons website and the 1-hour data are used for records back-up. Average values are attached to a file (ARC"year""month""day"_A3S.csv) located on the local hard drive and are sent via a DSL link to Pioneer's Butte office server. This server hosts the BTL website (www.lao-lagoons.com) that displays the 30-second average data from each of the remote monitoring devices. The 3-second interval data are also averaged over a 1-hour period. These 1-hour average values are attached to a file (ARC"year""month""day"_A1H.csv) on the local hard drive and sent via a DSL link to Pioneer's Butte office server. The 1-hour average data are distributed to TREC, Inc. for data management and analysis. See Section 2.0 for a description of all of the locations monitored, the equipment used, and the data that are collected.

Data that are transmitted back to the Operations Building are displayed on the operators' HMI, Invesys Wonderware InTouch software screen in the control room. The Wonderware software monitors all local statuses for the CAS and the status of all remote stations. The HMI also accepts operator set points and alarm set points. Graphical display screens with data trending capabilities are available for all process areas and show all process variables, equipment status or state, system set points, and alarm history.

All remote sites are equipped with Allen Bradley CompactLogix PLCs to monitor and control any of the remote sites process and/or monitoring equipment. The remote PLCs provide local control such as pump control logic or flow control logic, and monitor the local process for any alarm status such as loss of power, pump failure, instrument failure, and high/low level or flows. Data and site system status for all remote sites are collected by the Allen Bradley ContolLogix Master PLC at the Operations Building which polls each remote site for the data.

The HMI includes data logging and historian software to log all desired system-wide values and status points. Data are logged at various time intervals and into separate files for each logging interval. Data are saved in an appropriate format to match the data format now in use at other Atlantic Richfield treatment and process sites. All data are transferred to Pioneer, either daily or weekly, for analysis and reporting purposes.

The HMI system also provides alarms for any alarm state within the entire process and monitoring system. Alarm states are made available to the RACO Catalyst alarm dialer to notify any off-site operators or personnel of the alarm event or events. Alarms are broken down into several alarm severity categories and the call out are made according to severity logic. The RACO alarm dialer also has a separate battery power supply internal to the unit to ensure an alarm call out in the event that none of the backup systems come online after a power loss.

The HMI data management system monitors and logs data for the four following West Camp parameters.

1. Groundwater level in well BMF96-1D (as adjusted to the Travona water level) is logged hourly;
2. System flow rate that is being extracted from the West Camp is logged hourly;
3. Power is monitored by sending a “com fail” alarm to the operators indicating power loss at the West Camp pump house and is logged at the time of initial failure; and
4. H_2S is monitored and an alarm status will be logged and operator(s) notified callout via RACO alarm dialer.

9.0 OPERATIONS REPORTING AND RECORD KEEPING

Reporting and record keeping will be the responsibility of the system operator. Quantitative records such as water quality, water levels, and discharge rates should be maintained in electronic format, either Excel spreadsheet or Access database. Refer to SOP-4 West Camp Check (Appendix F) for additional guidance.

9.1 Daily Operations Report

Under normal, routine operating conditions, West Camp does not require a daily inspection. The site is visited and inspected at a frequency of twice per week. Data collected in the field during routine inspection are recorded on the BTL-LOA Weekly Ops Report on the day the inspection was conducted. A blank BTL-LOA Weekly Ops Report is available in Appendix D. Routine inspections are typically conducted every Monday and Thursday.

9.2 Weekly Operations Report

All field measurements, system maintenance and site visits will be recorded in the BTL-LAO Weekly Ops Report. A blank report is provided in Appendix D for reference. Entries documenting site visits will include at a minimum, time and date of observations, observations or site conditions, and field personnel numbers and each page will be signed and dated by the field personnel or logbook reviewer. All entries will be made in permanent black ink.

9.3 Monthly Operations Report

The ROD (EPA, 2006) requires monthly reporting of water levels in the West Camp. In addition, the total volume of water discharged to the water treatment facility and the results of any water quality analysis that was performed during the month are reported. These data are maintained as part of the permanent record for the site.

9.4 Quarterly Operations Report

Any problems or system upsets, including a summary of monthly reports, are reported quarterly in the TREC, Inc. LAO/WC Groundwater Treatability Study, Quarterly Operations and Maintenance Report. Copies of the quarterly report are distributed to the PRPs, EPA, Montana Department of Environmental Quality (DEQ) and BSB Planning Department (for public distribution).

9.5 Annual Operations Report

The ROD (EPA, 2006) requires that DEQ coordinate an annual report for the entire BMFOU. All data and records collected by the operator will be supplied to the project manager for DEQ in the TREC, Inc. LAO/WC Groundwater Treatability Study, Quarterly Operations and Maintenance Report.

9.6 Supplementary Data

The operation and performance of the system should be reviewed every five years. The five-year review report should summarize and include the following:

- Changes to the system;
- Significant problems or emergencies encountered;
- Summary of water quality trends;
- Hydrographs of West Camp water levels;
- Summary of pumping history;
- Recommendation for changes to the program including monitoring and reporting;
- Equipment inspection results and foreseeable replacement recommendations; and
- Addendum or update to this O&M Manual.

The information presented in the five-year review report will be consistent with the requirements of the *Clark Fork River Superfund Site Investigations – Standard Operating Procedures* (ARCO, 1992a), Laboratory *Analytical Plan* (ARCO, 1993) and *Quality Assurance Project Plan* (ARCO, 1992b).

10.0 ROUTINE INSPECTION AND MAINTENANCE GUIDELINES

Routine inspection and maintenance is performed as a component of daily system operation and maintenance. Routine inspection involves an operator's use of sight, sound, and touch to identify maintenance items.

A copy of this O&M Manual and the West Camp Inspection and Maintenance Checklist (Appendix D) should be maintained by the system operator and kept in the WCP-1 pump house. A log that specifies the date, time, flow rate and flow totals of each site visit will be maintained in the BTL-LAO Weekly Operations Report.

If replacement parts are needed or portions of the system require design changes and construction, the operator will notify Atlantic Richfield of the need and request approval to complete the modification or improvement. A Work Order is submitted to perform these types of activities. Details of the Work Order system are discussed in Volume V, Maintenance Plan. Specific procedures are provided for routine maintenance on specialized pieces of equipment. Refer to the procedures located in Volume V, Maintenance Manual for detailed instructions, specialized tool requirements, and protective measures.

10.1 Inspection and Maintenance Guidelines for Process Equipment

Inspection and maintenance guidelines for routine, operational maintenance is provided in this section. Detailed maintenance procedures are provided in Volume V, Maintenance Manual. The Maintenance Manual should be referenced for items out of scope as discussed below.

10.1.1 Scope and Organization

The following sections describe the routine inspection and maintenance tasks necessary for the site, process, and monitoring equipment. Appendix D provides information that details the routine inspection and maintenance tasks, including a schedule of task performance, and a discussion of records and reporting procedures. Major equipment maintenance is discussed in Volume V, Maintenance Manual.

10.1.2 Description of Access to Site Facilities

West Camp is located at 526 Centennial Avenue in Butte. West Camp is accessed via a graveled road from Centennial Avenue. The graveled road is approximately 360 feet in length and approximately 20 feet wide. The site also includes a parking area adjacent to the West Camp. The parking lot area includes a 60-foot turnaround area. An 8-foot, 9-gauge chain-link fence with two 12-foot locked gates secures West Camp.

10.1.3 Routine Maintenance Tasks

Much of the maintenance of West Camp can be performed through visual inspection of the system and associated components. Routine visual inspection enables operators to schedule maintenance tasks before emergency maintenance is required.

On a bi-weekly basis the following general site tasks will be performed:

1. A general visual inspection of the West Camp area will be performed;

2. Check for signs of trespass or vandalism including breaches in the fencing, gate or building locks;

3. Check for building damage due to trespass, vandalism or natural occurrences;

4. Check for signs of damage to any well-heads;

5. Check for any obvious signs of theft;

6. Check for signs of drainage erosion; pick up trash from the site and access road;

7. Assure that the site signs (H_2S Warning and Site Contact) are not damaged or stolen and replace them as necessary; and

8. Road and culvert maintenance and weed control will be performed annually.

10.1.3.1 Piping

On a bi-weekly basis the following task will be performed:

1. Make a visual inspection of all piping (4″-DI-WC001) at the WCP-1 looking for leaks, cracks, or breaks in the piping system.

10.1.3.2 Electrical Systems

The following tasks are performed bi-weekly:

1. Make a visual inspection of all electrical systems at West Camp; and

2. Confirm that all electrical systems (meters, alarms, etc.) are being supplied with power.

Annually:

1. Inspect all exposed cords and wiring for breaches in the protective insulated covering; and
2. Inspect all conduit, junction boxes, etc. to ensure proper condition and function.

10.1.3.3 WCP-1 Pump (P-WCP-1)

The Goulds submersible pump requires no scheduled maintenance. In fact, it should be left in place unless obvious signs of malfunction occur.

10.1.3.4 Valves (BFV-WCP5009)

Visually inspect valve connection, stem and packing at the valve handle, and valve body for obvious signs of leakage. Every five years, remove and inspect seats, seals, and gate for excessive wear and corrosion on the 4-inch Mueller LINESEAL® Butterfly Valve (BFV-WCP5009). Repair or replace as necessary.

10.1.3.5 Greenheck Exhaust Fan (EL-WCP107)

Every six months, the exhaust fan should be inspected. Lubricate the motor sleeve bearings, using S.A.E.>20 non-detergent oil (Appendix G). In addition, clean accumulated dirt off the propeller, motor guard, and shutter.

10.1.3.6 H_2S Monitoring System (AIT-WCP5000)

On a monthly basis, perform the low flow alarm test described in the Detcon H_2S Sensor User's Manual (Appendix G). This instrument is listed on the PSD checklist.

Every six months calibrate the H_2S meter as described in the Detcon H_2S Sensor User's Manual (Appendix G).

10.1.3.7 Flow Meter and Totalizer (FIT-WCP5006)

After two years of use the initial maintenance should be performed, including inspection of the flow meter. The frequency of subsequent maintenance inspections can be determined by the condition of the meter upon the initial inspection.

After five years of use, inspect the complete meter for wear and corrosion. See the McCrometer UltraMag® Flow Meter Operation and Maintenance Manual (Appendix G) for complete maintenance details.

10.1.3.8 Dwyer Pressure Gage (PI-WCP5013)

The Dwyer stainless steel pressure gauge should be inspected monthly for verification of proper operation and evidence of leakage around and near seals and couplings. The pressure gauge should be maintained according to the user's manual (Appendix G).

10.1.4 Schedule of Task Performance

Routine operational maintenance is based on daily, weekly, bi-weekly, monthly, quarterly, and semi-annual intervals. Intervals longer than those listed are considered non-routine. Non-routine maintenance items are discussed in Volume V, Maintenance Manual. The inspection and maintenance program will be updated when new inspection and maintenance tasks are defined as the result of on-going operations.

10.1.5 Equipment

Individual equipment manuals and other documentation provided by the manufacturers' are included as supplements to this O&M Plan. A listing equipment and equipment datasheet documentation is provided in Appendix E. Appendix G contains manufacturer's equipment data, which will be maintained and stored within the WCP-1pump house. Specific instructions related to maintenance, replacements, or repairs are provided in the Maintenance Manual. Refer to the Maintenance Manual, Volume V, for additional information.

10.1.6 Records and Record Keeping

The current date, time, flow rate, and totalized flow should be recorded in the WCP Weekly Operation and Field Parameter Record at the time of any flow adjustments or pump tests. The maintenance records are kept and maintained at the BTL Operations Building.

10.2 Spare Parts Inventory

Spare parts kept for West Camp are maintained in a dedicated location at LAO. Critical spare parts are also identified in Volume V, Maintenance. A spare pump and variable speed drive are maintained in inventory to allow timely replacement of the pump at West Camp.

Items retained in spare parts inventory are available in Table 1.

11.0 EMERGENCY PROCEDURES

In case of injury to personnel at the site, please refer to the *BTL Site Specific Health and Safety Plan (SSHASP)* (Pioneer, 2010). The quickest route to the hospital is included in Appendix K, and should be reviewed and understood by all site personnel. **To contact ambulance, fire, rescue or police call 911.** Provide the address "526 Centennial Avenue." Contact personnel and notification information is located in Section 1.4 of this document and also in the SSHASP.

11.1 Alarm Response Notification

Alarms associated with most of the inputs monitored at West Camp notify the operator(s) immediately after an upset, malfunction, or maintenance issue occurs. These alarms assist the operator(s) in maintaining consistent treatment and prevent unsafe conditions to human health or the environment. The automatic control system is equipped with a dialer that can deliver up to 15 distinct messages, set up according to priority (PRIMARY OR SECONDARY).

- PRIMARY alarms dial out a notification if the upset, malfunction, or maintenance issue continues after 2 minutes (120 seconds); and

- SECONDARY alarms dial out until after 10 minutes (600 seconds) of the upset, malfunction, or maintenance issue.

Callout priority for each alarm is shown in the Alarms List located in Table 2. Depending on the severity of the alarm, the operator is expected to respond to an alarm situation as soon as practicable.

Dialer notification is designed to advise the operator of appropriate needs, while minimizing nuisance alarms that could ultimately nullify the use of the system. When no immediate effect on system performance is probable, dialer notification will not be made and the alarm will be addressed on the next operator visit.

11.2 Alarm Conditions

Alarm conditions have been established as part of the automatic control system located at the BTL Operations Building. Table 2 provides a list alarm conditions that may be encountered at West Camp. Instruments and alarm set points are also provided in Volume I.

11.2.1 Fire

A 5-pound ABC fire extinguisher is located within the pump house at West Camp. The extinguisher is effective on wood, electrical, and chemical fires.

If a fire occurs at the West Camp Pumping Station an attempt should be made to extinguish the fire if it is of manageable size. If the main power switch can be reached safely, the power should be shut off immediately. Extinguish the fire with the ABC fire extinguisher located on site. Remain at the site until it is certain that the fire has been completely extinguished. Secure the site as necessary and notify proper personnel.

If the fire is not of manageable size, the fenced perimeter should be vacated and the local fire department should be contacted by dialing 911. If the main power switch can be reached safely, the power should be shut off prior to evacuating the site. To leave the fenced perimeter, exit through either of the two gates located at the west and east walls of the fence. The gates lock from the outside, therefore personnel must leave through the gate that has been opened to allow entry. **Under no circumstances should both gates be locked with personnel inside the fencing.** To evacuate the area walk quickly, taking the most direct route to the open gate. Once outside the perimeter fence and at a safe distance from the fire, dial 911 to notify the local fire department of the fire. Give the address as "526 Centennial Avenue, Butte."

11.2.2 Electrical Lines Disturbances

If an overhead electrical line is down at West Camp, do not approach the electrical line. Do not attempt to enter the fenced area and do not approach the fence. Remain well away from the electrical line; dial 911 to notify proper officials. Give the address as "526 Centennial Avenue, Butte."

If an electrical line should drop while personnel are inside the fenced perimeter, stay away from the downed line. If the line is across the fence do not attempt to leave the fenced perimeter. Dial 911 to notify proper officials. Give the address as "526 Centennial Avenue, Butte." Wait for emergency response personnel to arrive and provide assistance.

11.2.3 H_2S Alarm

In the unlikely event that H_2S levels in the pump house exceed 10ppm, dial 911 to notify officials of the nature of the alarm (elevated H_2S concentrations), so that responders will be equipped with proper PPE. Personal protective equipment for high H_2S atmospheres consists of a self-contained breathing apparatus (SCBA). Responders should also be prepared to deal with an explosive atmosphere. Although it is possible to monitor the H_2S remotely through the HMI system at the BTL, a site visit remains necessary to determine/confirm actual H_2S concentrations. Excessive H_2S concentrations can be lethal and explosive, therefore under no circumstances should the site be entered until emergency responders have determined that it is safe.

11.2.3.1 H_2S Alarm Site Response

If upon arriving at West Camp the H_2S alarm is activated, evacuate the site immediately by moving upwind. Refer to site windsock for current wind direction.

****** NOTE: At high H_2S concentrations, the sense of smell is lost, thus it is not a reliable indication of safe conditions. ******

After evacuating the area, immediately dial 911 to notify proper officials. Inform officials of the alarm and of the high H_2S condition (high H_2S concentrations) so that responders will be equipped with proper PPE. Under no circumstances should the site be entered until emergency responders have determined that it is safe.

If the H_2S alarm is activated while inside the West Camp pump house, immediately open the door and check the digital readout on the H_2S meter. If the readout is below 20 ppm the area is

safe, but keep the door open. Reset the alarm. If the readout on the H_2S meter is above 20 ppm evacuate the site immediately by moving upwind. Dial 911 to notify proper emergency response personnel. Inform officials of the alarm and of the high H_2S condition. Under no circumstances should the site be entered until emergency responders have determined that it is safe.

11.3 Emergency Shutdown

In the event of the need to shutdown pumping at West Camp due to piping failure, fire, or other cause, pumping operations will be suspended through remote operations located at the Operations Building at LAO. There is no need to enter the site to initiate emergency shutdown procedures. Normal shutdown sequence will be followed through remote, computer controlled operation. Refer to SOP-42 step #3b (Appendix F) and set the pump status to OFF. Continue to monitor West Camp level for the duration of the shutdown.

11.4 Waste Handling and Disposal

West Camp is essentially a transfer pumping station utilizing WCP-1. No chemicals are used, added, or stored at this location. Associated equipment requires minimal amounts of lubricants or additional compounds to be used in maintenance of the equipment. These fluids are typical of industrial equipment (oil, coolant, etc.). Waste generated at this site is expected to be associated with data verification tasks such as litter, paper, etc. Waste at this site shall be collected and placed in an appropriate receptacle and finally transported to the landfill. Material Safety Data Sheets (MSDS) for all compounds used or stored at West Camp is located in the SSHASP.

In the event that controlled waste is used, found, or generated at this site, contact the Atlantic Richfield Project Manager, Pioneer Project Manager, and Pioneer Safety Officer for further instructions. Refer to Section 1.4 for contact personnel.

11.5 Emergency Back-up Pumping System

In the event of loss of pumping capabilities at WCP-1, and water level rising to a level that would meet or exceed 5,435 feet amsl, the Travona pumping system can be utilized to provide short-term pumping capability. The Travona pumping system has a submersible pump already submerged to operating depths and electrical provisions made to the pump. Electrical provisions must be completed at the electrical disconnect to make the pump operable. In addition, temporary piping modifications, and a water truck must be available at the site in order to operate this system. All water pumped from the Travona system will be captured and treated at the BTL-LAO treatment system. Groundwater will not be routed to the BSB Water Treatment Plan. Operation of this system will be made available, and placed on stand-by status, when modifications are made to WCP-1. Operation of the Travona system will be implemented when water level of the West Camp reaches 5,434 feet amsl. Refer to Figure 3, WCP-DT-1, West Camp Decision Tree, for guidance when to implement the Travona pumping system.

12.0 REFERENCES

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Appendix A – System Drawings

Drawing Number	Drawing Title	Originator/ Company	Date
WCP-C-1	WEST CAMP PUMP STATION GENERAL SITE PLAN	PIONEER	3/25/2010
WCP-C-2	WEST CAMP ACCESS UPGRADES PLAN AND PROFILE	PIONEER	3/25/2010
WCP-C-3	WEST CAMP EXISTING CONDITIONS	PIONEER	3/25/2010
WCP-C-4	WEST SIDE SOILS, HAUL ROUTES	PIONEER	3/25/2010
WCP-D-1	WEST CAMP ROAD UPGRADES CROSS SECTIONS; STATIONS 0+00 THRU 0+75	PIONEER	3/25/2010
WCP-D-2	WEST CAMP ROAD UPGRADES CROSS SECTIONS; STATIONS 1+00 THRU 1+75	PIONEER	3/25/2010
WCP-D-3	WEST CAMP ROAD UPGRADES CROSS SECTIONS; STATIONS 2+00 THRU 2+75	PIONEER	3/25/2010
WCP-D-4	WEST CAMP ROAD UPGRADES CROSS SECTIONS; STATIONS 3+00 THRU 3+98	PIONEER	3/25/2010
WCP-D-5	WEST CAMP ROAD UPGRADES TYPICAL CROSS SECTIONS	PIONEER	3/25/2010
WCP-D-6	WEST CAMP ENGINEERED STORM WATER CHANNEL DETAILS	PIONEER	3/16/2010
WCP-D-7	WEST CAMP PUMP STATION FACILITY UPGRADES PLAN VIEW	PIONEER	3/25/2010
WCP-D-8	WEST CAMP PUMP STATION ELECTRICAL UPGRADES PLAN VIEW	PIONEER	3/25/2010
WCP-D-9	WEST CAMP PUMP STATION PLUMBING AND PIPE HOUSING DETAIL	PIONEER	3/25/2010
WCP-D-10	WEST CAMP PUMP STATION PIPE, FOOTINGS, AND SLAB DETAIL	PIONEER	3/25/2010
WCP-D-11	WEST CAMP PUMP STATION PITLESS ADAPTER AND MANHOLE DETAIL	PIONEER	3/25/2010
WCP-D-12	WEST CAMP PUMP PREFABRICATED CONCRETE BUILDING DETAILS	PIONEER	3/25/2010
WCP-D-13	WEST CAMP PUMP PREFABRICATED CONCRETE BUILDING DETAILS	PIONEER	3/25/2010
I&C-C-7	MSD PIPING AND INSTRUMENTATION DIAGRAM	PIONEER	12/22/2010
I&C-C-8	BRW DRYING BED PIPING AND INSTRUMENTATION DIAGRAM	PIONEER	12/22/2010
I&C-C-9	TYPICAL REMOTE STATION PIPING AND INSTRUMENTATION DIAGRAM	PIONEER	12/22/2010
I&C-G-3	BPSOU MONITORING LOCATIONS SITE MAP	PIONEER	12/22/2010
I&C-G-4	BTL-LOA PROCESS FLOW SCHEMATIC	PIONEER	12/22/2010
I&C-G-5	PROCESS INSTRUMENTATION AND CONTROL COMMUNICATION PATH	PIONEER	12/22/2010
D46-15IN-023	LAO, WEST CAMP STATION ONE LINE DIAGRAM & CONDUIT SCHEDULE	MSE/ TG	8/16/2010
D46-15IN-024	LAO, WEST CAMP STATION POWER GENERAL ARRANGEMENT	MSE/ TG	8/16/2010
D46-15IN-025	LAO, WEST CAMP STATION SCADA PANEL LAYOUT	MSE/ TG	8/17/2010
D46-15IN-026	LAO, WEST CAMP STATION TERMINAL BLOCK LAYOUT	MSE/ TG	8/18/2010
D46-15IN-027	LAO, WEST CAMP STATION POWER DISTRIBUTION	MSE/ TG	8/19/2010
D46-15IN-028	LAO, WEST CAMP STATION I/OMODICON #1 PIN LAYOUT	MSE/ TG	8/20/2010
D46-15IN-029	LAO, WEST CAMP STATION I/OMODICON #2 PIN LAYOUT	MSE/ TG	8/21/2010
D46-40IN-001	LAO CHEMICAL ADDITION SYSTEM BUILDING SCADA PANEL	MSE/ TG	12/15/2010
D46-40IN-002	LAO REMOTE SYSTEM SCADA PANEL	MSE/ TG	12/15/2010

Appendix B – System and Component Design Calculations

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Dwyer 2" SS Pressure Gage, Model SGB
4" McCrometer UltraMag Flow Meter
4" Mueller LINESEAL® Butterfly Valve
Rosemount Water Level Measurement System
Detcon Model TP-624C H_2S Monitor
Greenheck Exhaust Fan

Appendix H – Butte Remediation Evaluation System

Appendix I – Seasonal Pumping Rates

Under development

Appendix J –West Camp Retention Time/Holding Capacity

Under development